

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

In the Matter of)	
)	
Amendment of Parts 2, 25, and 87 of the)	
Commission's Rules to Implement Decisions)	
From World Radiocommunication)	ET Docket No. 02-305
Conferences Concerning Frequency Bands)	
Between 28 MHz and 36 GHz and to)	
Otherwise Update the Rules in this Frequency)	
Range)	
)	
Amendment of Parts 2 and 25 of the)	RM-10331
Commission's Rules to Allocate Spectrum for)	
Government and Non-Government Use in the)	
Radionavigation-Satellite Service)	

To: The Commission

PETITION FOR PARTIAL RECONSIDERATION

AirTV Limited ("AirTV"), by counsel and pursuant to Section 1.429 of the Federal Communications Commission's ("Commission") Rules (47 C.F.R. § 1.429), hereby seeks reconsideration of a portion of the Commission's *Report and Order* in the above-captioned proceeding.¹ AirTV has developed, and plans to implement, a global, satellite-based Direct-to-Aircraft ("DTA") entertainment and connectivity system that will provide live broadcast television and two-way data services. AirTV intends to operate utilizing the 2535-2655 MHz portion of the 2520-2670 MHz Broadcast Satellite Service ("BSS") S-band allocation for the

¹ See *Amendment of Parts 2, 25, and 87 of the Commission's Rules to Implement Decisions from World Radiocommunication Conferences Concerning Frequency Bands Between 28 MHz and 36 GHz and to Otherwise Update the Rules in this Frequency Range and Amendment of Parts 2 and 25 of the Commission's Rules to Allocate Spectrum for Government and Non-Government Use in the Radionavigation-Satellite Service*, 18 FCC Rcd 23426 (2003) ("*Report and Order*"). Public Notice of this action was published in the Federal Register thirty days ago, on December 23, 2003. See 68 Fed. Reg. 74321 (Dec. 23, 2003). Accordingly, this Petition is timely filed pursuant to Section 1.429(d) of the Commission's Rules. See 47 C.F.R. § 1.429(d).

provision of global downlink services to commercial aircraft and the 18.1-18.4 GHz band feeder link band for uplink channels in a few locations.²

Specifically, AirTV believes that the Commission acted arbitrarily and without proper foundation when it concluded that terrestrial services would need to mitigate interference caused by AirTV's system and subsequently eliminated the BSS allocation in the 2500-2690 MHz band from the U.S. Table of Frequency Allocations in Section 2.106 of the Commission's Rules.³ The record in this proceeding directly contradicts the Commission's conclusion by demonstrating that BSS allocation can be used feasibly with co-primary terrestrial allocations. The Commission does not serve the public interest by unnecessarily acting now to delete the BSS from the 2520-2670 MHz band, especially considering that the deletion runs counter to the United States' international obligations. Thus, AirTV urges the Commission to reconsider and rescind this portion of its decision, and to reinstate the BSS allocation in the 2520-2670 MHz band.⁴

AirTV, however, strongly supports the Commission's decision to delete footnote NG101 from the U.S. Table of Frequency Allocations.⁵ By deleting the footnote, the Commission extends to BSS the increased flexibility provided to the Instructional Television Fixed Service ("ITFS") and removes a restriction no longer necessary to fulfill the Commission's service objectives.

² AirTV is an interested party in this proceeding for purposes of Section 1.429(a) of the Commission's rules (47 C.F.R. § 1.429(a)), as it filed comments and reply comments below with regard to the Commission's proposals for the BSS allocation at 2500-2690 MHz, and is aggrieved by the Commission's actions in the *Report and Order*.

³ *Report and Order* at ¶ 47.

⁴ AirTV limits its request for reinstatement of the BSS allocation to the band 2520-2670 MHz, which conforms to the international allocation in Article 5 of the International Telecommunication Union ("ITU") Radio Regulations.

⁵ 47 C.F.R. § 2.106, NG101.

Argument

I. The Commission Should Rescind Its Unsubstantiated and Erroneous Conclusion That Terrestrial Services Will Need to Mitigate Interference Caused by AirTV's BSS System.

In the *Report and Order*, the Commission inaccurately concluded that “a system [such as AirTV’s] would increase costs for terrestrial services due to the need to mitigate interference caused by [such a] system.”⁶ Nothing in the record provides technical support or an explanation for this conclusion. To the contrary, the record actually demonstrates that AirTV’s global system will not cause an unacceptable amount of interference to U.S. terrestrial services.

No commenter in this proceeding submitted technical findings or studies demonstrating the infeasibility of BSS and terrestrial co-existence in the 2520-2670 MHz band. The only Commission findings mentioned in the record that suggest unacceptable interference with terrestrial systems in the band do not concern BSS systems.⁷ These findings relate only to the compatibility of co-frequency sharing of Mobile Satellite Services (“MSS”) and terrestrial services in bands (2500-2520 MHz (space-to-Earth) and 2670-2690 MHz (Earth-to-space)) that have never been allocated to the BSS internationally. Moreover, given that the projected power flux-density (“PFD”) levels for MSS satellites are significantly higher than those of AirTV’s BSS DTA system, the conclusions of these studies have no bearing on the feasibility of sharing between the BSS and terrestrial systems.

Not only does the record lack evidence in support of the Commission’s conclusion regarding unacceptable interference, it contains evidence affirmatively and directly contravening the Commission’s conclusion. Numerous studies from ITU working groups, the

⁶ *Report and Order* at ¶47.

⁷ See *Report and Order* at ¶ 42 (citing Commission conclusion in separate proceeding that sharing between mobile-satellite service links and terrestrial systems in bands adjacent to 2520-2670 MHz would not be feasible); WCA Comments at 2.

Administration of Canada, and AirTV itself have addressed the compatibility of third generation (3G) terrestrial wireless services with BSS systems in the 2520-2670 MHz band. As AirTV presented in its Comments, Reply Comments, and meetings with Commission staff, the results of these studies confirm that BSS transmissions of the type to be produced by the global AirTV system will generate PFD levels significantly below the maximum satellite PFD levels allowed for the BSS frequencies in Table 21-4 of Article 21 of the ITU Radio Regulations ("Table 21-4"), thus demonstrating that AirTV's system will not produce unacceptable interference to U.S. terrestrial systems, including those using second generation technology.⁸

The attached study buttresses these claims of the feasibility of BSS/terrestrial sharing of 2520-2670 MHz and provides detailed technical support.⁹ The study uses conventional ITU agreed-upon methodologies for determining the Interference-to-Noise Ratio (I/N) from a BSS satellite into a terrestrial receiver, and the parameters of the terrestrial receivers are based on ITU recommended values for terrestrial services. The analysis calculates the interference level (I/N) into a typical terrestrial base station and hand-held unit from a satellite producing: (a) the maximum satellite PFD levels permitted for the BSS frequencies as required by Table 21-4 of the ITU Radio Regulations ("Table 21-4") and the United States; and (b) the specified AirTV system PFD levels over the United States. In the case of the maximum PFD limits allowed by Table 21-4, the interference level (I/N) from a BSS satellite into terrestrial receivers should be less than the ITU-recommended maximum level of -6 dB.¹⁰ Some 3G proponents have proposed the more stringent criterion of -10 dB. The analysis shows that the

⁸ See AirTV Comments at 5-7; AirTV Reply Comments at 2-4; Letter from Robert M. Sorbello, Senior Vice President, Engineering & Technology, AirTV Limited, to Marlene H. Dortch, Secretary, FCC (August 28, 2003). See also Letter from Director General, Radiocommunications and Broadcasting Regulatory Branch, Industry Canada to Licensees of Multipoint Communications Systems (MCS) dated August 26, 2002, available at <http://strategis.ic.gc.ca/epic/internet/insmt-gst.nsf/vwGeneratedInterE/sf08011e.html>.

⁹ Attachment 1, AirTV study entitled, "Feasibility of Co-Frequency Sharing Between BSS Systems and Terrestrial Systems in the Band 2535-2655 MHz."

¹⁰ See Recommendation ITU-R F.758-2.

interference from the AirTV BSS system is comfortably below either criterion. In the case of the PFD produced by satellites of the AirTV BSS system, the I/N interference levels into the terrestrial receivers are, in all cases, less than -16.5 dB. The PFD levels of satellites in AirTV's system are thus significantly below both the Table 21-4 PFD mask and any level that would cause harmful interference.

The obvious conclusion flowing from the results of the AirTV study is that a BSS system of AirTV's design will not cause harmful interference to U.S. terrestrial services. Indeed, the terrestrial systems will not, for all practical intents, know the BSS system is there, and thus will not need to incur any costs whatsoever to mitigate BSS interference.

As demonstrated by the studies cited in the record, and as confirmed by the attached study, a BSS system can use the BSS allocation at 2520-2670 MHz without causing harmful interference to terrestrial systems. Because AirTV has represented, and reiterates here, that it is prepared to operate its BSS system without claiming protection from harmful interference from terrestrial systems, the feasibility inquiry should have been concluded in favor of the retention of the BSS allocation. The Commission's conclusion to the contrary should be reconsidered and rescinded.

II. The Commission Erred in Placing the Burden on AirTV to Demonstrate That the BSS Will Not Cause Unacceptable or Worse Interference to Co-Frequency/Co-Primary Terrestrial Services.

The BSS allocation at 2520-2670 MHz, which existed in the United States until the publication of the *Report and Order*, still exists throughout the rest of the world. AirTV has plans to implement its global system in accordance with this allocation in ITU Regions 1, 2, and 3, with plans to ultimately serve the United States. Any modification or deletion of this existing BSS allocation should occur only after an affirmative showing that co-existence with co-frequency/co-primary terrestrial services is not feasible. Instead, in the *Report and Order*, the

Commission misplaces the burden on AirTV, requiring it to demonstrate “that its system will not cause interference to terrestrial services that use the band 2520-2670 MHz.”¹¹

In the course of making spectrum allocation decisions, the Commission must first determine, through technical findings, that a potential service allocation can feasibly co-exist with existing services in the subject frequency band – the feasibility of sharing the band is a “threshold determination.”¹² Conversely here, where the Commission considers deletion of an existing allocation, the Commission should require a technical showing from the allegedly harmed terrestrial services that co-existence is infeasible. As discussed *supra*, the record in this proceeding contains no evidence to this effect. No commenter, terrestrial service or otherwise, has demonstrated that BSS operations in the 2520-2670 MHz band cause or will cause unacceptable or worse interference. In fact, to the contrary, AirTV made a technical showing – reinforced here – that its service operates well below the PFD limit mask specified in Table 21-4.¹³

III. In Light of the Studies Demonstrating That U.S. Terrestrial Services Can Be Protected From BSS in the 2520-2670 MHz Band, the Commission Should Wait to Deal with System-Specific Interference Issues, if Any, in an Application Proceeding.

The record in this proceeding demonstrates that U.S. terrestrial services can be protected from certain BSS systems in the 2520-2670 MHz band; and therefore, it is not necessary and not in the public interest to act now to delete the BSS allocation from the 2520-

¹¹ *Report and Order* at ¶ 47. By misplacing the burden and deleting an allocation without proper consideration of infeasibility, the Commission frustrates the expectations of those corporations, in this case AirTV, who rely on existing allocations when designing their satellite systems and conceiving build out plans that often take several years to implement and place into successful operation.

¹² *Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range; Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates; and Applications of Broadwave USA, PDC Broadband Corporation, and Satellite Receivers, Ltd. to Provide a Fixed Service in the 12.2-12.7 GHz Band*, 18 FCC Rcd 8428, ¶ 29 (2003).

¹³ See Attachment 1.

2670 MHz band. Any general determination as to the BSS allocation would be premature, as well as arbitrary and capricious. To the extent that BSS systems of other designs may emerge in the future, a Commission decision to retain and restore the BSS allocation at 2520-2670 MHz would not prevent it from addressing new issues as they arise or from making individual determinations regarding the compatibility of specific BSS systems with terrestrial services on a case-by-case basis in the course of an application or letter of intent proceeding.

By acting in a rulemaking proceeding, the Commission can only take the drastic action of deleting an entire allocation. This action runs counter to the public interest, because the Commission looks to fix an alleged interference problem with a few BSS systems by deleting the entire allocation – a clear overstep. As discussed above, BSS system designs exist that do not cause harmful interference. It does not serve the public interest to deny consumers access to these services that do not interfere.

Only in an application or letter of intent proceeding can the Commission appropriately and adequately deal with a specific proposal's alleged interference issues. In these proceedings, the Commission can weigh the technical showings of each proposed BSS system in particular and determine whether it can feasibly coexist with terrestrial services. If the system is not compatible, then the Commission could either deny the party's application or restrict it to only compatible uses. Proceeding in this manner serves the public interest, because the Commission does not preemptively exclude viable and useful consumer services without a determination as to that service's compatibility with existing terrestrial services.

IV. The Commission Must Not Ignore U.S. Obligations Under the WTO or Interfere With Canada's Presumptive Right To Offer Services.

The Commission has both incorrectly assessed, and preemptively contravened, U.S. international obligations by deleting the BSS allocation from the 2520-2670 MHz band. Its

conclusion that the World Trade Organization (“WTO”) General Agreement on Trade in Services (“GATS” or the “Agreement”) “does not apply to AirTV’s system” is incorrect.¹⁴ Moreover, under the Most Favored Nations provisions of the GATS, the Commission should not interfere with the satellite service offerings of another country, in this case Canada, where no harmful interference into its own services exists.

All WTO members, including the United States, are bound to the obligations defined in GATS, which encourages international competition in basic telecommunications services, including those satellite-based services. When GATS was adopted, the U.S. exempted the one-way satellite transmission of direct-to-home (“DTH”) and direct broadcast satellite (“DBS”) television services and digital audio services from its commitment. These terms have very specific meanings that are unique to the United States, and do not extend to the DTA BSS service at 2.5 GHz that is to be provided by the Canadian-authorized AirTV system.

In the United States, “DBS services” means direct broadcast satellite service – a subset of the BSS that is limited to a specific 500 MHz band. DBS is not a term used in ITU literature or treaties, and has no independent international standing. Sections 25.201 and 25.202(a)(7) of the Commission’s Rules define DBS as those direct broadcast services in the 12.2-12.7 MHz band.¹⁵ Therefore, BSS in the 2.5 GHz band does not fall within the U.S. definition of DBS, and AirTV’s system falls within the United States’ Commitment under the GATS. The Commission should fulfill the United States’ Commitment and not preemptively block viable international competitors from entering the DTA market by deleting the BSS allocation from the 2520-2670 MHz band.

In addition to honoring its commitment under GATS, the Commission should respect Canada’s presumptive right to offer satellite services. Industry Canada has determined

¹⁴ *Report and Order* at ¶ 47.

¹⁵ 47 C.F.R. §§ 25.201, 25.202(a)(7).

that it is feasible and in Canada's best interest to allow for the provision of the BSS in the 2500-2690 MHz band. The United States should not impede Canada's decision, if the proposed service is technically compatible with the United States' terrestrial services. The Commission has no reason, and in truth no power, to deny Canada's right to provide these services in the United States, especially where, as in this case, the satellite system willingly accepts the risk of interference from U.S. terrestrial systems.

V. The Commission Correctly Decided to Delete Footnote NG101, and Should Reinstate the BSS Allocation at 2520-2670 MHz Without this Provision.

The Commission's deletion of Footnote NG101 in the *Report and Order* follows the Commission's relaxation of the requirements for ITFS, which has allowed those ITFS licensees technical flexibility in the interest of increasing the number of service offerings to consumers. When the Commission initially established ITFS in the 2500-2690 MHz band on a shared basis with existing fixed service stations, it envisioned that the service would be used "for the formal education of students."¹⁶ The Commission has since allowed for broader use of the ITFS spectrum, providing "ITFS licensees with greater technical flexibility."¹⁷ Specifically, the Commission has revised its rules to allow "licensees to shift their required educational programming onto fewer than their authorized number of channels by 'channel loading,'" to permit the employment of digital technologies, and to construct digital two-way systems.¹⁸

¹⁶ *Applications of Savannah College of Art and Design for Construction Permit and License in the Instructional Television Fixed Service on the G-Group Channels at Bloomingdale, Georgia and Diocese of Savannah For Construction Permit and License in the Instructional Television Fixed Service on the A-Group Channels at Savannah, Georgia*, FCC 03-266, slip op. at ¶ 2 (released Dec. 13, 2003).

¹⁷ *Id.* at ¶ 3.

¹⁸ *Id.*

These changes have facilitated a broader use of the ITFS spectrum, particularly by wireless cable operators who use the spectrum for their own non-educational purposes.¹⁹

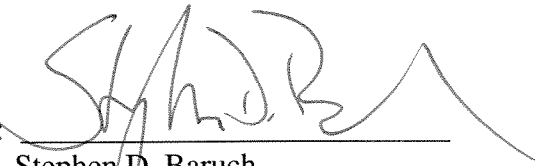
In this proceeding, the Commission merely, if perhaps unintentionally, recognized, as it has with respect to ITFS, that the educational restriction is an unnecessary vestige of an original service limitation. The deletion of Footnote NG101 in no way impacts a terrestrial educational focused system. AirTV supports the Commission's actions to promote the public interest by allowing for the provision of a broader range of programming to consumers, and urges the Commission not to restore Footnote NG101 when it restores the BSS allocation at 2520-2670 MHz.

Conclusion

For all of the foregoing reasons, AirTV urges the Commission to reconsider its initial decision that BSS/terrestrial sharing of the 2520-2670 MHz band is not feasible. In the case of BSS systems of AirTV's design, such sharing is undeniably feasible. As a result, the Commission should restore the BSS allocation at 2520 –2670 MHz to Section 2.106 of the Commission's Rules – without Footnote NG101.

Respectfully submitted,

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¹⁹ See, e.g., WCA Comments at 5, n. 14.

ATTACHMENT 1

Feasibility of Co-Frequency Sharing Between BSS Systems and Terrestrial Systems in the Band 2535 – 2655 MHz

1.) Background

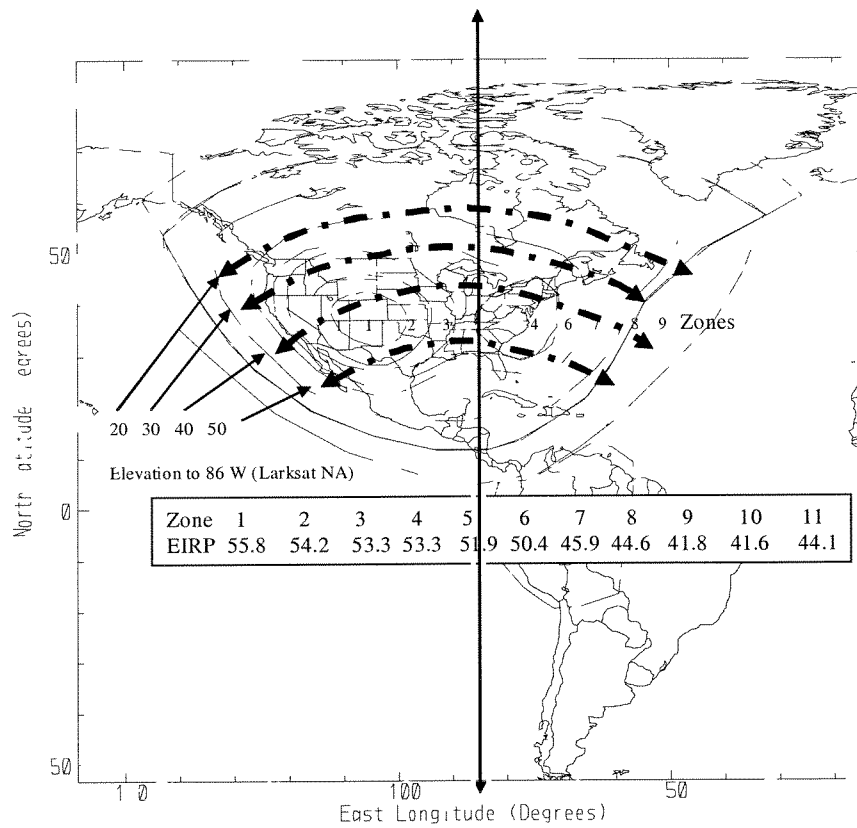
The band 2520-2670 MHz has a primary allocation in all three ITU regions for broadcast satellite services (BSS). It shares a co primary allocation with terrestrial services which consist primarily of Instructional Television Fixed Services (ITFS) and Multipoint Distribution Services (MDS). Increasingly, this band is being used for two-way digital broadband services and is targeted for future 3rd generation (3G) wireless services that will operate into small mobile terminals.

The application of 3G services has raised the question of whether spectrum sharing with BSS is technically feasible. A number of studies have been performed by AirTV, Industry Canada and various ITU working groups to address this issue. The following analysis addresses specifically the compatibility of the planned AirTV service over the continental United States with future 3G services, and validates that AirTV will cause no harmful interference into 3G services. As 3G services are more sensitive to interference than ITFS/MDS systems, the demonstration that no harmful interference will be caused by an AirTV-type BSS system into 3G services confirms as well that sharing between the BSS and ITFS/MDS systems is technically feasible. It is not necessary to assess the interference case from terrestrial systems into a AirTV-type BSS system in the context of this feasibility assessment, as BSS systems of AirTV's design are prepared to operate in the band without claiming protection from terrestrial systems.

2.) Introduction

AirTV has developed a unique direct to aircraft (DTA) entertainment and connectivity system for the global commercial airline market. The AirTV services will be delivered through a constellation of four AirTV-owned geostationary ("GSO") satellites to provide seamless global coverage. These GSO satellites will operate in a one-way, broadcast-only mode, using the 18.1-18.4 GHz BSS feeder link band for uplink channels and the 2535-2655 MHz portion of the 2520-2670 MHz BSS S-band allocation for provision of global downlink services to commercial aircraft. The AirTV network will operate in conjunction with the Inmarsat system to provide two-way data services.

Service to aircraft over North America will be primarily through the AirTV satellite located at 86 W longitude. Figure 1 depicts the EIRP coverage contours over North America and the ground terminal elevation contours for locations over the United States. Over the United States the AirTV EIRP ranges from 55.8 dBW to 50.4 dBW. The bandwidth of the satellite's transponders is 27 MHz. AirTV has carefully designed its system to operate within the Power Flux Density ("PFD") limit mask specified in Table 21-4 of Article 21 of the ITU Radio Regulations. This mask imposes hard limits on satellite power transmissions to ensure compatibility with co-primary terrestrial services. Figure 2 depicts the PFD mask specified in Table 21-4 and also shows the nominal AirTV PFD values over the United States. It should be noted that the AirTV PFD values are more than 8 dB below the ITU specified hard limits.



LARKSAT NA (86 W) Coverage Contours

Figure 1 - AirTV North America Coverage at 86 W

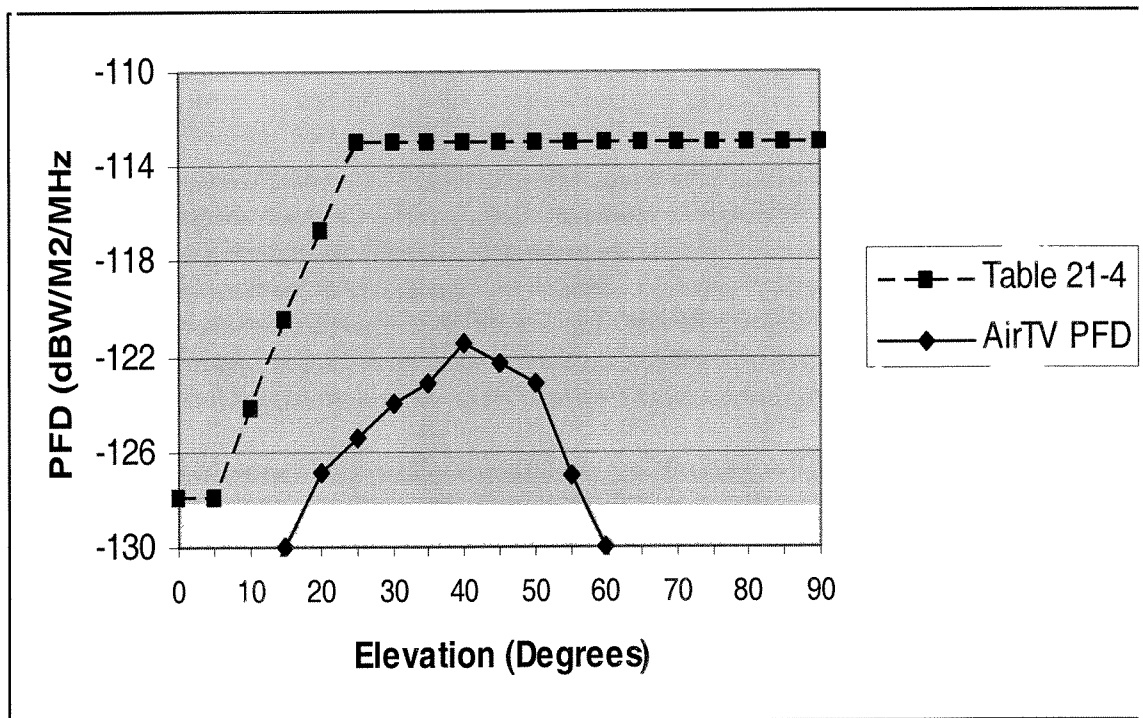


Figure 2 – AirTV Satellite PFD over United States

3.) Interference Analysis

An accepted method for determining interference from a satellite system into a terrestrial receiver is by calculating the Interference to Noise ratio (I/N) into the receiving terminal. The interference from a broadcasting satellite into a receiving station, such as a future 3G terminal, can be expressed as a function of the satellite PFD as follows:

$$I = \text{PFD}(\epsilon) + 10\log(\lambda^2/4\pi) + \text{Gain}(\theta) - L_{\text{feeder}}$$

where:

I:	interference at the input of the receiver
PFD (ϵ):	pfd as a function of angle of arrival ϵ (dBW/m/MHz)
λ :	wavelength
Gain (θ);	antenna gain as function of angle θ to satellite (dBi)
L_{feeder} :	feeder loss (dB)

and

$\lambda = c/f$	
c:	speed of light = 3×10^8 (meters/sec)
f:	mid-band frequency (Hz)

The noise power or noise floor at the input of the receiver is given by

$$N = 10 \times \log(kT_s B)$$

where:

N:	noise floor
k:	Boltzman's constant = 1.3805×10^{-23} (W/°K/Hz)
T_s :	system noise temperature
B:	receiver bandwidth (Hz)

The system noise temperature referenced to the receiver input can be obtained as follows:

$$T_s = T_{\text{ant}}/L + (1-1/L)T_o + T_R$$

and

$$T_R = (F-1)T_o$$

Where T_{ant} is the equivalent antenna noise temperature, L is the total loss due to components at the receiver inputs (antenna feed, diplexer, connectors, etc.) and F is the receiver noise figure.

For a terrestrial microwave receiving antenna having the background noise temperature of earth, one can assume $T_{\text{ant}} = T_o = 290^\circ \text{K}$. Thus, the total noise power at the input of the receiver becomes:

$$N = 10 \times \log(kT_o B F)$$

4.) Antenna Pattern for Terrestrial Base Station and Customer Premise Equipment (CPE) Antenna

The receive pattern of a 3G terrestrial antenna will vary by manufacturer, but for the most part, will conform to Rec. ITU-R F.1336-1. Based on this recommendation, the following equations are used to determine the radiation patterns for a typical 3G base station sectoral antenna.

$$G(\theta) = \max (G_1(\theta), G_2(\theta))$$

$$G_1(\theta) = G_o - 12(\theta / \theta_3)^2$$

$$G_2(\theta) = G_o - 12 + 10\log((\max(\theta / \theta_3, 1))^{-1.5} + k)$$

where:

$G(\theta)$:	gain relative to isotropic (dBi)
G_o :	maximum gain in or near the horizontal plane (dBi)
θ :	absolute value of the elevation angle relative to the angle of maximum gain ranging from 0 to 90 degrees
θ_3 :	3 dB beamwidth in the vertical plane (degrees)
ϕ_s :	3 dB beamwidth in the azimuthal plane (degrees)
k :	parameter related to the sidelobe levels of the antenna

For sectoral antennas with a 3 dB beamwidth in the azimuthal plane less than approximately 120 degrees, the relationship between the maximum gain in the azimuth plane and the 3 dB beamwidth in both the azimuth and elevation plane is:

$$\theta_3 = (31000 \times 10^{-0.1 G_o}) / \phi_s$$

where ϕ_s is the 3 dB beamwidth in the azimuthal plane (degrees).

For receiving stations that use antennas with quasi omni directional pattern, such as the consumer premise equipment (CPE), the relationship between the gain and the 3 dB beamwidth in the elevation plane is:

$$\theta_3 = 107.6 \times 10^{-0.1 G_o}$$

5.) Characteristics and Assumptions for Terrestrial 3G Systems

Tables 1 and 2 show the system characteristics for a typical 3G base station and CPE antenna. These values are based on typical parameters used by the various ITU Working Groups and derived from the equations in Section 4.

Table 1

Base Station Characteristics

Max. Antenna Gain (0° Elev.)	16 dBi
Bandwidth	5 MHz, 10 MHz
Noise Figure	4 dB
Noise Floor	-139.9 dBW/ 1 MHz
Feeder Loss	4 dB

Table 2

CPE Characteristics

Max. Antenna Gain (0° Elev.)	2 dBi
Bandwidth	5 MHz, 10 MHz
Noise Figure	5 dB
Noise Floor	-138.9 dBW/ 1 MHz
Feeder Loss	0 dB

The following parameters are assumed in the interference analysis calculations;

- Mid band frequency is 2595 MHz
- I/N objective is – 6 dB for 1 dB degradation in margin (Recommendation ITU-R F.758-2)
- $k = .2$
- Base station and CPE antennas are linearly polarized

Figure 3 shows the plot of a sectoral antenna pattern for a typical 3G base station. The pattern is calculated using the equations in Section 4.

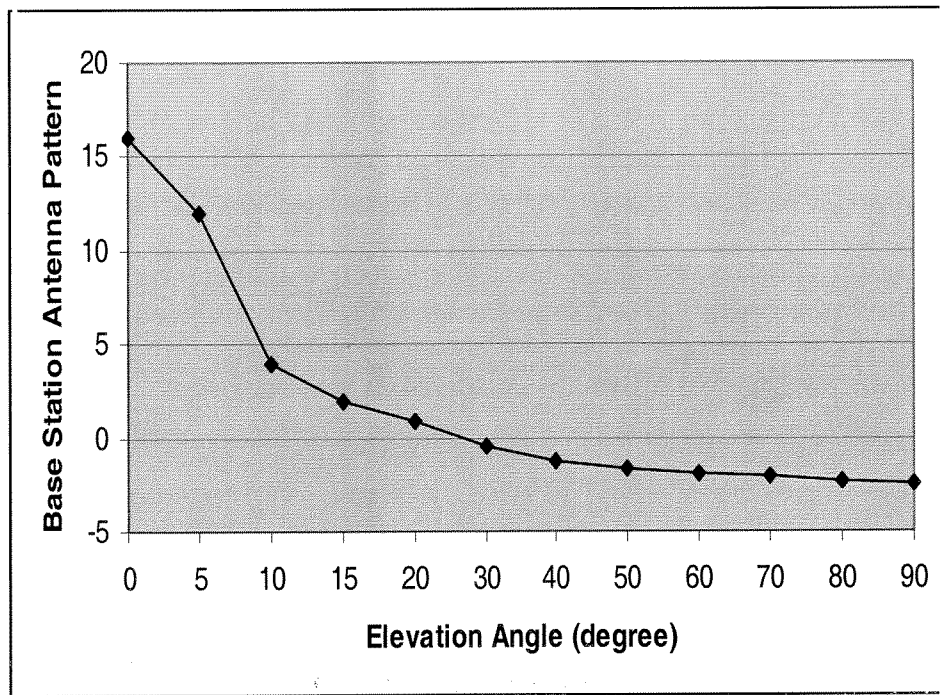


Figure 3 - Antenna Pattern for 3G Base Station

Figure 4 shows the plot of the antenna pattern for a typical 3G CPE terminal. The pattern is calculated using the equations in Section 4.

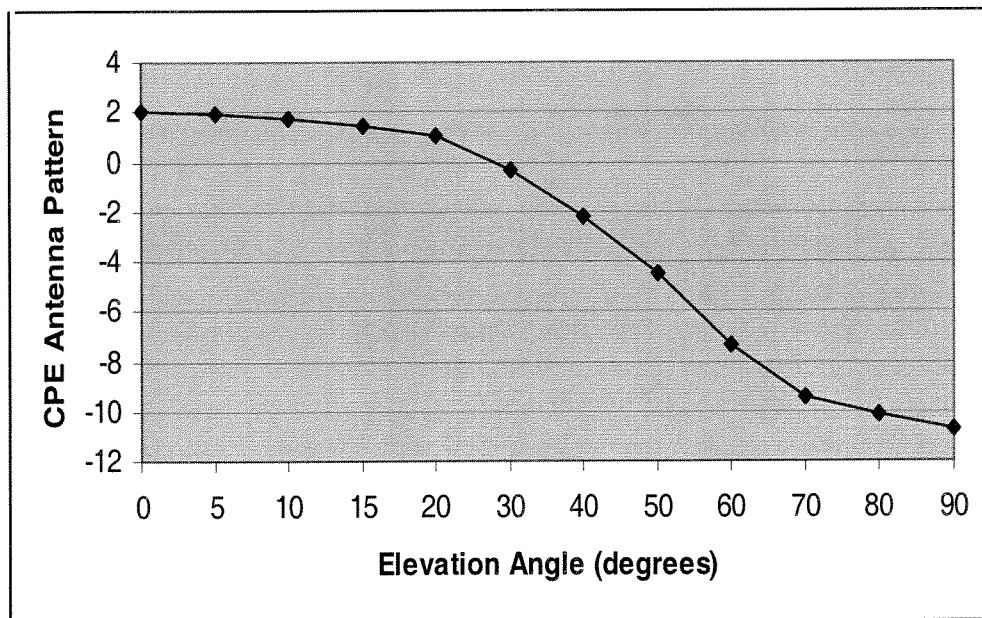


Figure 4 – Antenna Pattern for 3G CPE Terminal

6.) Results of BSS Interference into 3G Terrestrial Service

Interference from a broadcasting satellite into 3G receiving system is calculated using the equations in Section 4 and the terrestrial system characteristics given in Section 5. An analysis using the PFD values from the hard-limit mask of RR Table 21-4 is performed along with an analysis that uses the nominal PFD values of the AirTV satellite over the United States.

6.1) Case 1 – Analysis with PFD Mask of RR Table 21-4

Angle	0	5	10	15	20	30	40	50	60	70	80	90
PFD	-128	-128	-124.2	-120.5	-116.7	-113	-113	-113	-113	-113	-113	-113
Gain	16	12	4	2	0.9	-0.5	-1.2	-1.7	-1.9	-2.1	-2.3	-2.4
Feed & Polar. Loss	6	6	6	6	6	6	6	6	6	6	6	6
I	-147.7	-151.7	-155.9	-154.2	-151.5	-149.2	-149.9	-150.4	-150.6	-150.8	-151.0	-151.13
Noise Floor	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9	-139.9
I/N	-7.83	-11.83	-16.08	-14.33	-11.68	-9.33	-10.03	-10.53	-10.73	-10.93	-11.13	-11.23

Table 3 – Interference into Base Station Receiver

Angle	0	5	10	15	20	30	40	50	60	70	80	90
PFD	-128	-128	-124.2	-120.5	-116.7	-113	-113	-113	-113	-113	-113	-113
Gain	2	1.9	1.7	1.4	1	-0.3	-2.2	-4.5	-7.4	-9.4	-10.1	-10.7
Feed & Polar. Loss	2	2	2	2	2	2	2	2	2	2	2	2
I	-157.7	-157.8	-154.2	-150.8	-147.4	-145.0	-146.9	-149.2	-152.1	-154.1	-154.8	-155.4
Noise Floor	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9	-138.9
I/N	-18.83	-18.93	-15.38	-11.93	-8.58	-6.13	-8.03	-10.33	-13.23	-15.23	-15.93	-16.53

Table 4 – Interference into CPE Receiver

Discussion of Results

Tables 3 and 4 show the results of the I/N calculations for a BSS service radiating at the maximum allowed PFD specified by Table 21-4. It was assumed that the BSS service transmits in circular polarization, like the AirTV system, while the terrestrial antennas are linearly polarized. This provides up to 3 dB of polarization discrimination by the terrestrial antenna. In the above analysis a conservative 2 dB of discrimination is assumed.

Tables 3 and 4 show that in all cases the I/N objective of -6dB is achieved. At I/N = -6 dB, the receive noise floor increases by less than 1 dB which will have a negligible impact on the terrestrial system's performance.

6.2) Case 2 – Analysis with AirTV PFD Values over United States

Angle	0	5	10	15	20	30	40	50	60	70	80	90
PFD					-126.9	-124	-121.5	-123.1				
Gain	16	12	4	2	0.9	-0.5	-1.2	-1.7	-1.9	-2.1	-2.3	-2.4
Feed & Polar. Loss	6	6	6	6	6	6	6	6	6	6	6	6
I					-161.73	-160.23	-158.43	-160.53				
Noise Floor					-139.9	-139.9	-139.9	-139.9				
I/N					-21.83	-20.33	-18.53	-20.63				

Table 5 – Interference into Base Station

Angle	0	5	10	15	20	30	40	50	60	70	80	90
PFD					-126.9	-124	-121.5	-123.1				
Gain	2	1.9	1.7	1.4	1	-0.3	-2.2	-4.5	-7.4	-9.4	-10.1	-10.7
Feed & Polar. Loss	2	2	2	2	2	2	2	2	2	2	2	2
I					-157.63	-156.03	-155.43	-159.33				
Noise Floor					-138.9	-138.9	-138.9	-138.9				
I/N					-18.73	-17.13	-16.53	-20.43				

Table 6 – Interference into CPE

Discussion of Results

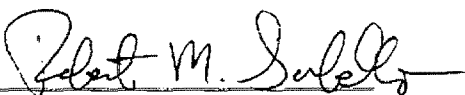
Over the United States the look angle to the AirTV satellite at 86 W ranges from 20 to 50 degrees. The PFDs from the AirTV satellite were used at these elevation angles to compute the I/N. The analysis shows that the I/N ratio ranges from -16.53 dB to -20.43 dB for the CPE receiver and from -18.53 to -21.83 for the base station receiver. These levels are totally imperceptible to the terrestrial receiver resulting in no harmful interference to a 3G terrestrial system.

Conclusion

On the basis of the foregoing analysis, it is clear that a BSS system of the AirTV design can be operated feasibly with all existing and potential terrestrial service systems in the 2520-2670 MHz band.

TECHNICAL CERTIFICATE

I hereby certify, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the technical information contained in the foregoing Petition for Partial Reconsideration and associated Attachment 1, that I am familiar with Parts 2 and 25 of the Commission's Rules, and that the technical information referenced above is complete and accurate to the best of my knowledge and belief.

By: 
Robert M. Sorbello
Senior Vice President, Engineering and Technology
AirTV Limited

Dated: January 22, 2004